REMARKS

Claims 1-6 and 8-20 remain pending in the application upon entry of this amendment. Claims 21-23 are canceled herein. Applicants acknowledge that the Examiner has withdrawn the finality of the previous Office Action in view of a new rejection. Favorable reconsideration of the application is respectfully requested in view of the amendments and following remarks.

I. REJECTION OF CLAIMS 21-23

Claims 22-23 stand rejected pursuant to 35 U.S.C. § 112, second paragraph, as being indefinite. Claims 21-23 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Keller et al., U.S. Patent No. 5,891,790 (Keller). Claims 21-23 have been canceled herein. Accordingly, these rejections are moot.

II. REJECTION OF CLAIMS 1-6 AND 8-20 PURSUANT TO 35 U.S.C. § 103(a)

Claims 1-6 and 8-12 stand rejected under 35 U.S.C. § 103(a) as being obvious over Keller by itself. Claims 13-20 stand rejected under 35 U.S.C. §103(a) as being obvious over Keller in view of other more tertiary references. Applicants respectfully traverse the rejections for at least the following reasons.

In previous Office Actions, the Examiner rejected claim 1 (and various dependent claims) as being anticipated by Keller. Claim 1 recites a method of growing a p-type nitride semiconductor material by molecular beam epitaxy (MBE), the method comprising supplying bis(cyclopentadienyl)magnesium (Cp_2Mg) during the growth process. Applicants previously argued that Keller does not teach or suggest growing a p-type nitride semiconductor material by *molecular beam epitaxy* (MBE) by supplying bis(cyclopentadienyl)magnesium (Cp_2Mg) during the growth process.

The Examiner had referred to Keller as teaching a method of growing a p-type nitride semiconductor material by MBE, citing column 2, lines 49-52. Applicants pointed

out, however, that this passing reference to MBE does not describe in detail any MBE process. The entire disclosure, save for these lines, is devoted to MOCVD processes. The Examiner also stated that Keller teaches a method that includes supplying Cp_2Mg during the growth process, citing column 3, lines 63-67. Applicants pointed out, however, that the growth process referenced at this passage *is an MOCVD process*.

Applicants, therefore, argued that when Keller describes the use of Cp_2Mg to dope the gallium nitride with magnesium, such discussion is only in the context of an MOCVD process. For example, Keller describes at column 3, lines 2-10 the basic construction of the MOCVD apparatus. In describing the use of the MOCVD apparatus, Keller describes using Cp_2Mg to dope the gallium nitride. (See col. 3, lines 61-67.) There is no disclosure or suggestion in Keller, however, that Cp_2Mg can be used as a p-type dopant in any other process, including an MBE process as recited in claim 1.

In addition, Applicants argued that, as stated in the current application, MOCVD processes are characterized in that the growth materials are supplied using a carrier gas flowing substantially parallel to the surface of the substrate upon which epitaxial growth is to take place. In contrast, MBE processes are carried out in an ultra-high vacuum environment. The growth materials are supplied from heated effusion cells, which travel across the MBE chamber to the substrate. (See application at page 1, last paragraph through page 2, first full paragraph.) As demonstrated in response to the previous Final Office Action, Keller teaches only an MOCVD process employing carrier gases. (See col. 3, lines 17-45 and 64-66; col. 4, lines 1-5 and 46-49.) Such use of carrier gases would not work in an MBE process, which requires an ultra-high vacuum environment.

Furthermore, Applicant argued that in the method of Keller, the p-type dopants are activated during the growth phase. (See col. 2, lines 61-63; col. 4, lines 1-5.) Such a process cannot be employed in an MBE process because of the ultra-high vacuum environment.

In the current Office Action, the Examiner no longer takes the position that Keller anticipates the use of Cp_2Mg as the p-type dopant material in an MBE process.

Instead, the Examiner states that the use of Cp_2Mg as the p-type dopant material in an MBE process *is obvious* over Keller pursuant to 35 U.S.C. § 103(a). (See Office Action at page 7, last paragraph to page 8, first paragraph.) The Examiner's conclusion is based upon the assumption that "MBE has similar process functionality with other growth techniques such as metal-organic chemical vapor deposition (MOCVD), and would be expected to function similarly for growing a p-type nitride semiconductor material." (Office Action at 8.) Applicants respectfully disagree.

Specifically, Applicants' dispute the Examiner's characterization that MBE has "similar process functionality" to MOCVD growth techniques. For example, Keller's invention essentially is "a method for activating the p-type dopants during the growth phase" (e.g., col. 2, lines 61-62). MBE processes differ in that there is no need to activate the dopants during the growth as in MOCVD processes. Indeed, as stated above, the p-type dopants are not activated during the growth phase of an MBE process because of the ultra-high vacuum environment. Furthermore, unwanted contamination by carbon is a known problem in MBE processes. Consequently, those skilled in the art would not employ a carbon containing dopant, such as Cp_2Mg, in an MBE process. Applicants' process operates against this convention by using Cp_2Mg as a dopant material. Another distinction, described above, is that MBE processes are carried out in a vacuum, while MOCVD processes employ carrier gases.

Accordingly, in pertinent aspects, MBE and MOCVD processes do not have "similar process functionality", as assumed by the Examiner. One skilled in the art, therefore, would not understand from Keller to use Cp_2Mg as the p-type dopant material in an MBE process, as recited in claim 1 (and thus incorporated into the dependent claims). In addition, the tertiary references, cited against dependent claims 13-20, do not make up for the deficiencies of Keller, and the Examiner does not suggest otherwise.

For at least these reasons, claims 1-6 and 8-20 are not obvious over Keller, whether individually or in combination with the other tertiary references. Accordingly, the reject of these claims should be withdrawn.

II. CONCLUSION

For the foregoing reasons, claims 1-6 and 8-20 are believed to be allowable and the application is believed to be in condition for allowance. A prompt action to such end is earnestly solicited.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Respectfully submitted,

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